Differences In Countermovement Vertical Jump Height Between Stronger And Weaker Female Police Officers

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DIFFERENCES IN COUNTERMOVEMENT VERTICAL JUMP HEIGHT BETWEEN STRONGER AND WEAKER FEMALE POLICE OFFICERS

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Abstract

Strength and power are essential for performing tasks related to law enforcement. However, at this time the relationship between absolute and relative strength and power has yet to be investigated among female law enforcement officers. **PURPOSE:** The purpose of this study was to investigate the differences in relative (REL) measures of strength and countermovement vertical jump (CMJ) height in stronger and weaker female law enforcement officers. **METHODS:** Retrospective data for 26 female officers (age = 35.46 ± 9.22 yrs; height = 168.1 ± 6.01 cm; body mass = 73.48 ± 15.35 kg) from one agency were provided for analysis. Measures included isometric leg/back dynamometer (LBD) strength and CMJ height. Relative strength was calculated by dividing LBD scores by body mass (LBDr). The officers were then categorized into above (LBDr ≥1.6) and below average (LBDr < 1.6) strength groups based on their mean LBDr score. An independent samples t-test and a Cohen's effect size calculation were used to assess mean score differences in vertical jump height by group. **RESULTS:** An independent samples t-test revealed no significant differences in CMJ performance (38.4 ± 4.8 vs. 35.8 ± 4.3) between groups. However, a medium-large (*d* = .57) effect size was discovered between the stronger and weaker groups. **DISCUSSION**: These results suggest that stronger female officers have a greater propensity to jump higher than their weaker counterparts. This could impact job-specific performance where lower-body power is required (e.g. suspect pursuit, obstacle clearance). This investigation also highlights the need to utilize advanced statistical methods, such as effect size calculations, to determine the least amount of worthwhile differences in performance when analyzing smaller sample sizes.

Introduction

- As part of their job duties, police officers may be required to perform high-intensity, short-duration activities, such as sprinting, dodging, lifting, carrying, pushing, jumping, and stair climbing, all while under load (1-3).
- Leg strength and power are thought to be essential for performing these tasks successfully (1,2).
- As such, these attributes are frequently assessed within these populations (1-3).
- Previous research has reported that male officers possessing greater relative isometric leg/back strength performed better in the countermovement jump (CML) compared to their weaker counterparts (3).
- At this time it is unknown whether similar differences in CMJ performance exist between stronger and weaker female officers.

PURPOSE: To investigate the differences in relative (REL) measures of strength and countermovement vertical jump (CMJ) height in stronger and weaker female law enforcement officers.

Methods

- Retrospective data for 26 female officers (age = 35.46 ± 9.22 yrs; height = 168.1 ± 6.01 cm; body mass = 73.48 ± 15.35 kg) from one US based law enforcement agency were provided for analysis.
- All measurements were evaluated and recorded by a Certified Tactical Strength and Conditioning Facilitator (TSAC-F).
- Isometric leg/back dynamometer (LBD) strength was measured using a leg/back chain dynamometer.
- Countermovement jump (CMJ) height was measured using an electronic switch mat (e.g., Just Jump Mat).
- Relative strength was calculated by dividing LBD scores by body mass (LBDr).
- Subjects were then categorized into above (LBDr ≥1.6) and below average (LBDr < 1.6) strength groups based on their mean LBDr score.
- An independent samples t-test ($p < .05$) and a Cohen's effect size calculation were used to assess mean score differences in vertical jump height by group.

Results

An independent samples t-test revealed no significant differences in CMJ performance (38.4 ± 4.8 vs. 35.8 ± 4.3) between groups. However, a medium-large (*d* = .57) effect size was discovered between the stronger and weaker groups.

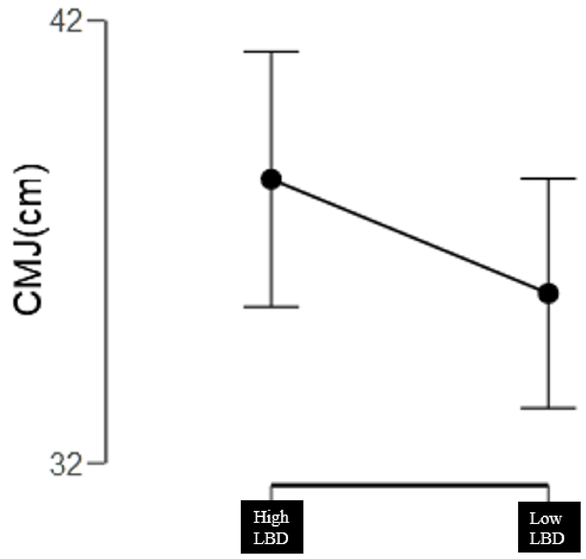
Table I. Group descriptives by LBDr groups

	Group	N	Mean ± SD	Cohen's d	ES
Age (yrs)	HIGH	13	36.23 ± 11.14*	0.164	Small
	LOW	13	34.69 ± 7.19		
BM (kg)	HIGH	13	66.6 ± 8 13.93	-0.986	Large
	LOW	13	80.35 ± 13.95		
HT (cm)	HIGH	13	166.27 ± 6.01	-0.637	Moderate
	LOW	13	169.99 ± 5.63		
CMJ (cm)	HIGH	13	38.41 ± 4.77	0.569	Moderate
	LOW	13	35.83 ± 4.29		
LBDa (kg)	HIGH	13	124.83 ± 23.86‡	0.843	Large
	LOW	13	108.39 ± 13.81		
LBDr (ratio)	HIGH	13	1.88 ± 0.148	2.98	Very Large
	LOW	13	1.37 ± 0.19		

* $p < .05$, ** $p < .01$, ‡ $p < .001$

Results (Cont.)

Figure 1: Differences in CMJ Height by LBDr



Discussion

- The results of this study suggested that stronger female officers have a greater propensity to jump higher than their weaker counterparts.
- These results are similar to previous findings of Dawes et al (2019) in that male officers that displayed greater relative strength performed better on measures of lower-body power (e.g., CMJ height, PAPw and P:BM).
- In order to perform their jobs effectively and efficiently it is essential that female officers possess good relative lower-body strength and power.
- Female officers should participate in strength an conditioning programs designed to optimize these attributes (i.e., resistance training, plyometrics, etc).

References

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